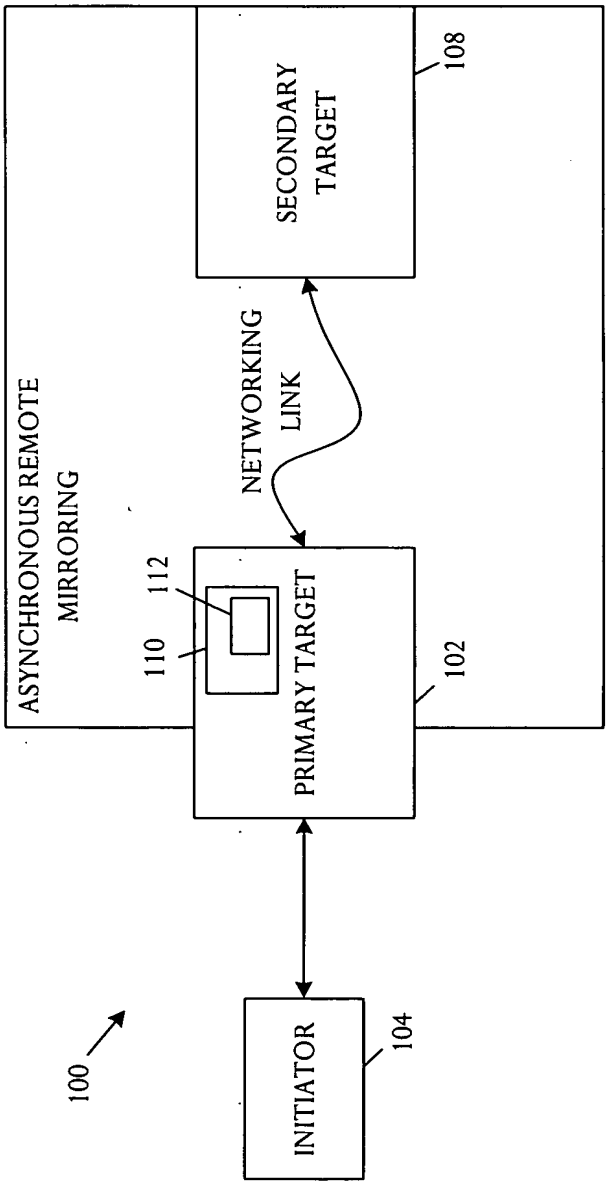
ASYNCHRONOUS REMOTE MIRRORING
SECONDARY TARGET
108
NETWORKING LINK
112
110
PRIMARY TARGET
102
INITIATOR
104
100

FIG. 1

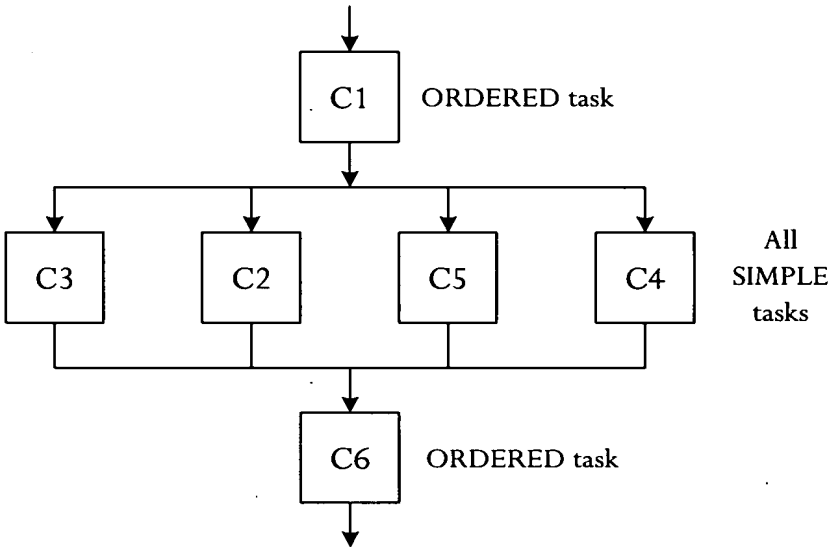

FIG. 2

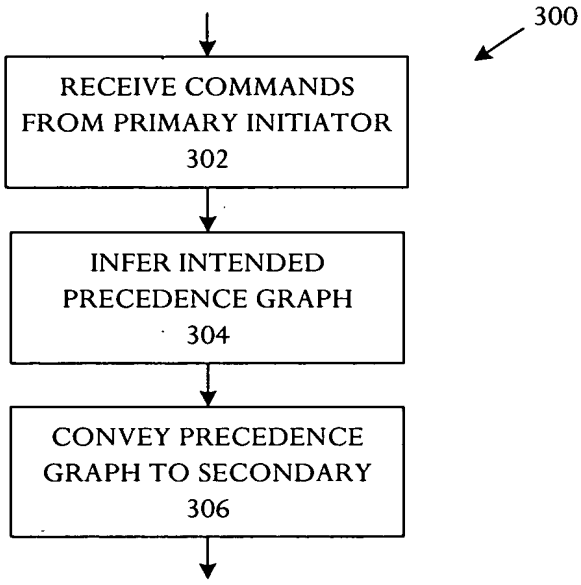
300
RECEIVE COMMANDS FROM PRIMARY INITIATOR 302
INFER INTENDED PRECEDENCE GRAPH 304
CONVEY PRECEDENCE GRAPH TO SECONDARY 306

FIG. 3

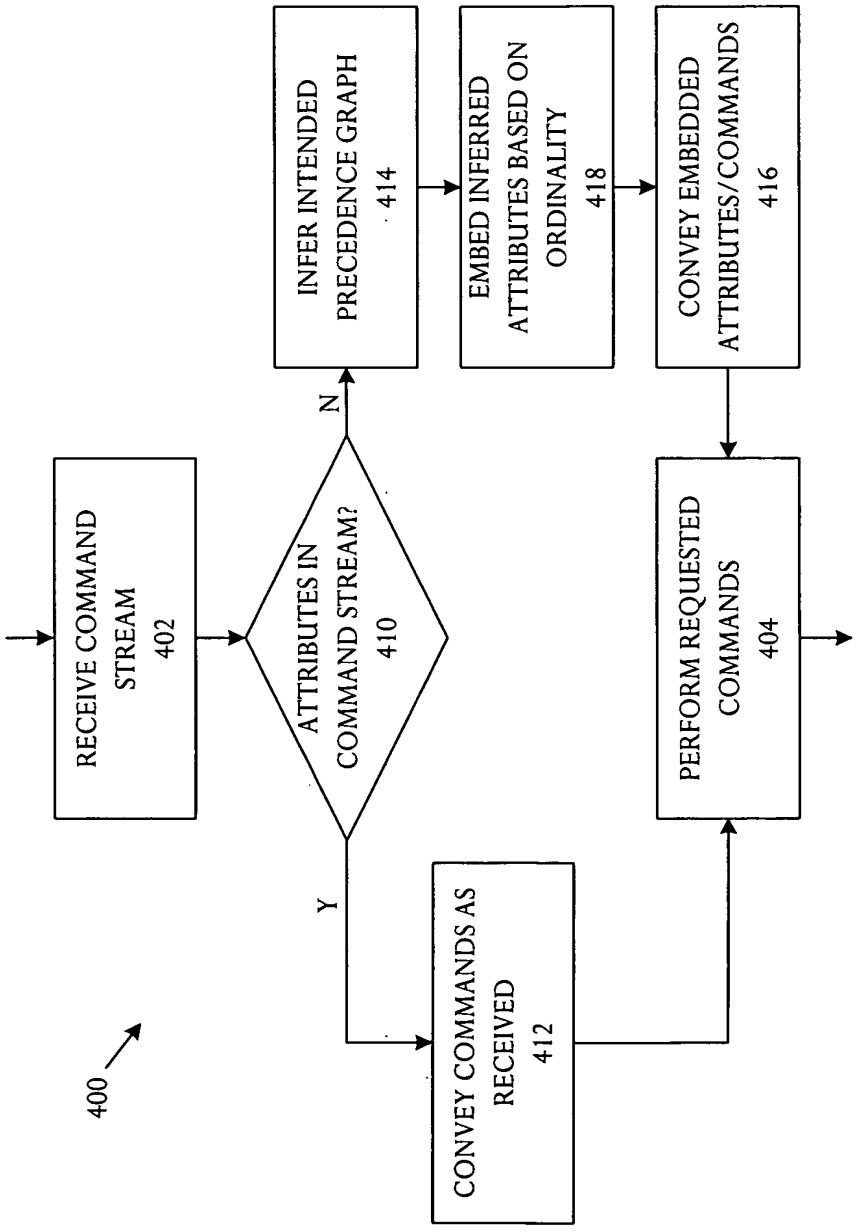
RECEIVE COMMAND STREAM 402
ATTRIBUTES IN COMMAND STREAM? 410
N
Y
INFER INTENDED PRECEDENCE GRAPH 414
EMBED INFERRED ATTRIBUTES BASED ON ORDINALITY 418
CONVEY EMBEDDED ATTRIBUTES/COMMANDS 416
CONVEY COMMANDS AS RECEIVED 412
PERFORM REQUESTED COMMANDS 404
400

FIG. 4

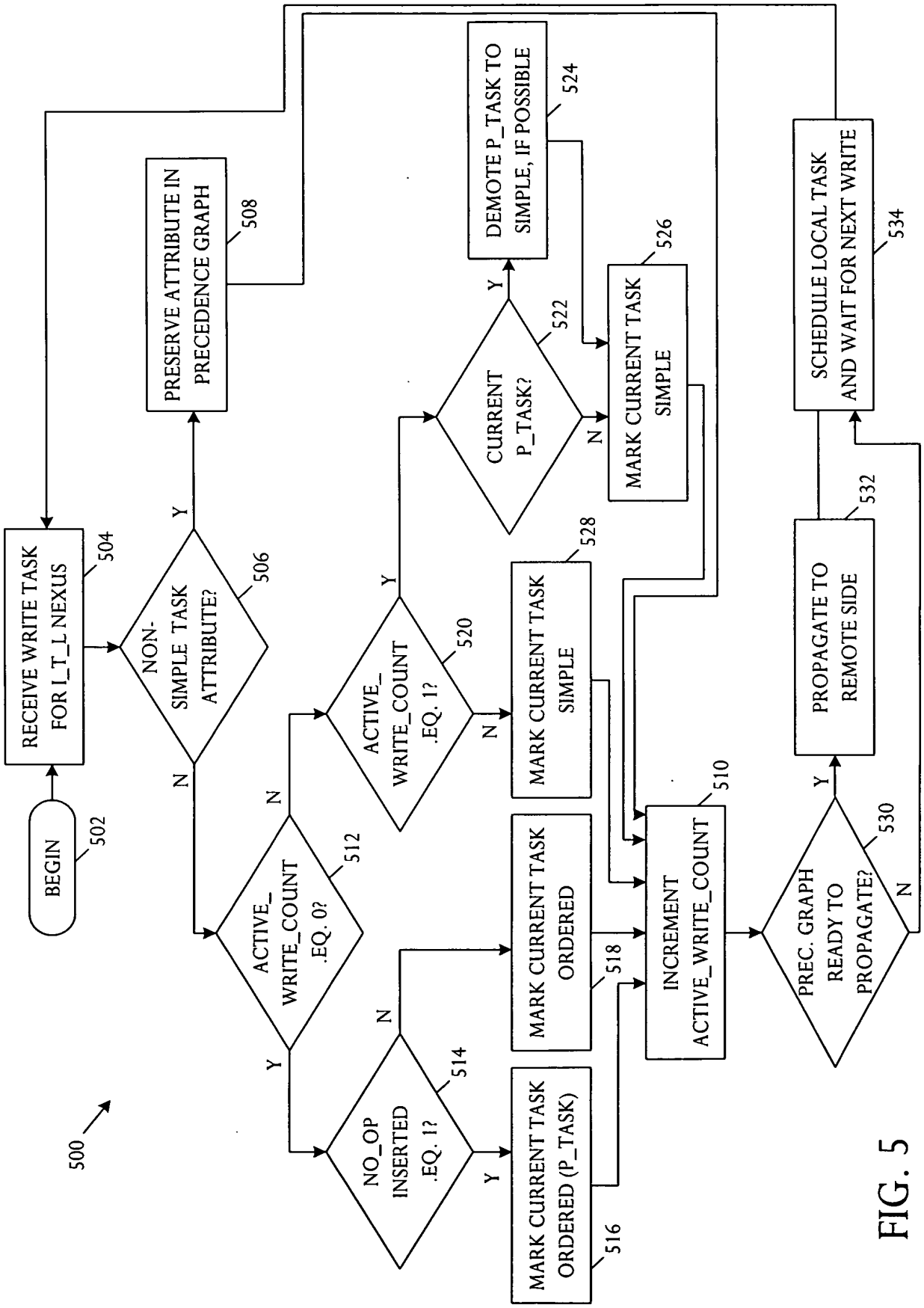
500
BEGIN
502
RECEIVE WRITE TASK FOR I_T_L NEXUS
504
NON-SIMPLE TASK ATTRIBUTE?
506
Y
N
PRESERVE ATTRIBUTE IN PRECEDENCE GRAPH
508
ACTIVE_WRITE_COUNT .EQ. 0?
512
Y
N
NO_OP INSERTED .EQ. 1?
514
Y
N
MARK CURRENT TASK ORDERED (P_TASK)
516
MARK CURRENT TASK ORDERED
518
ACTIVE_WRITE_COUNT .EQ. 1?
520
Y
N
CURRENT P_TASK?
522
Y
N
DEMOTE P_TASK TO SIMPLE, IF POSSIBLE
524
MARK CURRENT TASK SIMPLE
526
MARK CURRENT TASK SIMPLE
528
INCREMENT ACTIVE_WRITE_COUNT
510
PREC. GRAPH READY TO PROPAGATE?
530
Y
N
PROPAGATE TO REMOTE SIDE
532
SCHEDULE LOCAL TASK AND WAIT FOR NEXT WRITE
534

FIG. 5

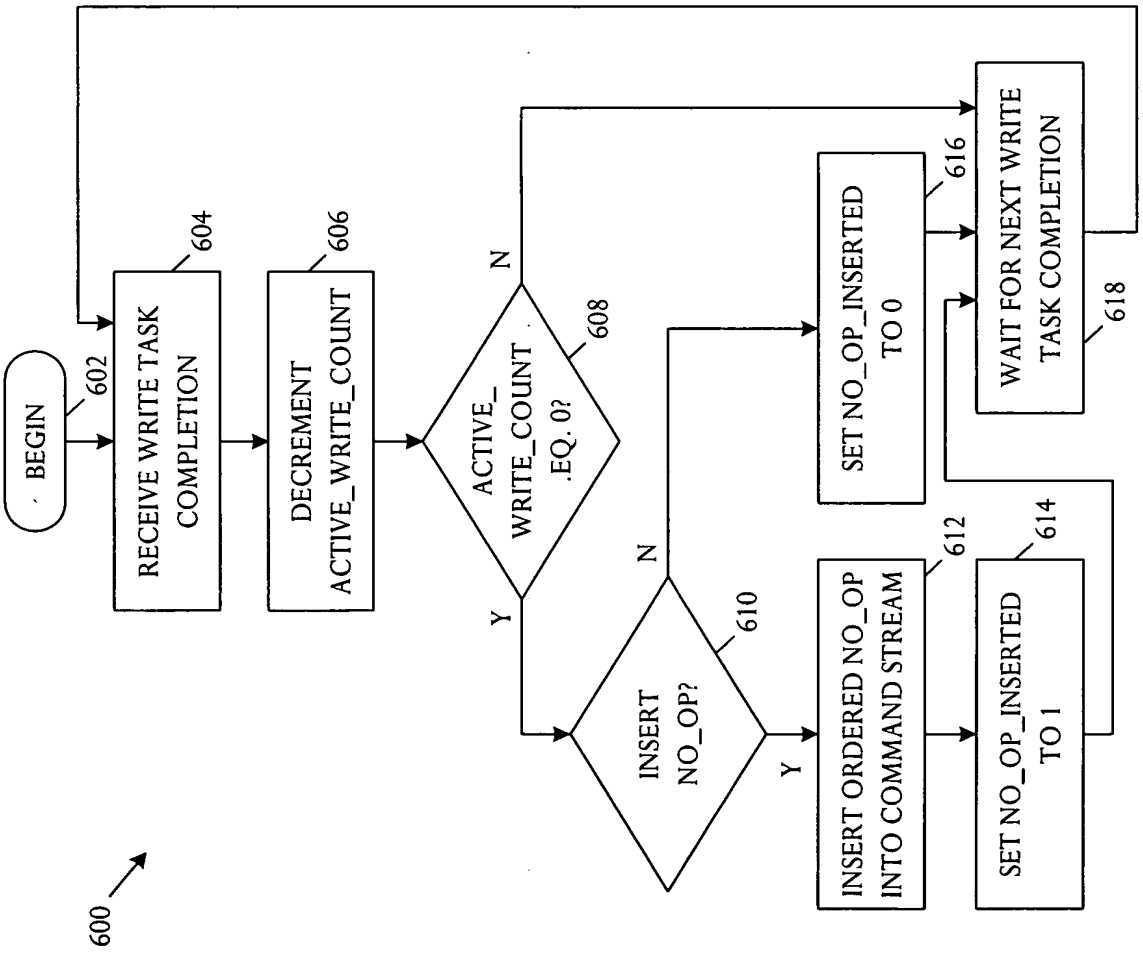
600
BEGIN
602
RECEIVE WRITE TASK COMPLETION
604
DECREMENT ACTIVE_WRITE_COUNT
606
ACTIVE_ WRITE_COUNT .EQ. 0?
608
N
Y
INSERT NO_OP?
610
N
Y
INSERT ORDERED NO_OP INTO COMMAND STREAM
612
SET NO_OP_INSERTED TO 1
614
SET NO_OP_INSERTED TO 0
616
WAIT FOR NEXT WRITE TASK COMPLETION
618

FIG. 6

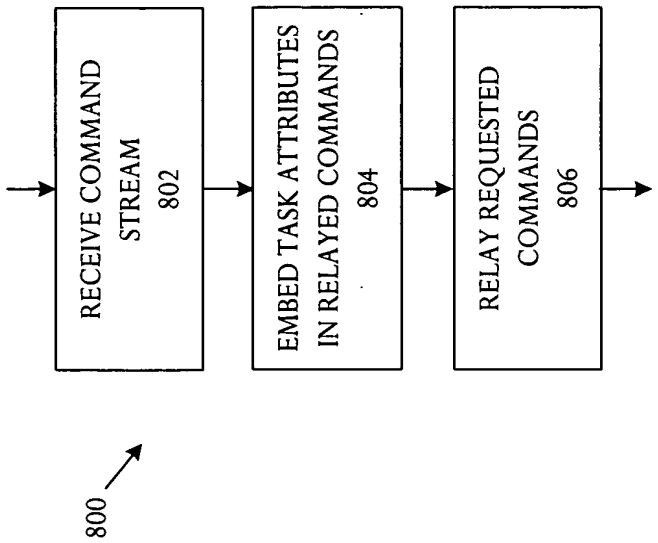
RECEIVE COMMAND STREAM
802
EMBED TASK ATTRIBUTES IN RELAYED COMMANDS
804
RELAY REQUESTED COMMANDS
806
800

FIG. 8

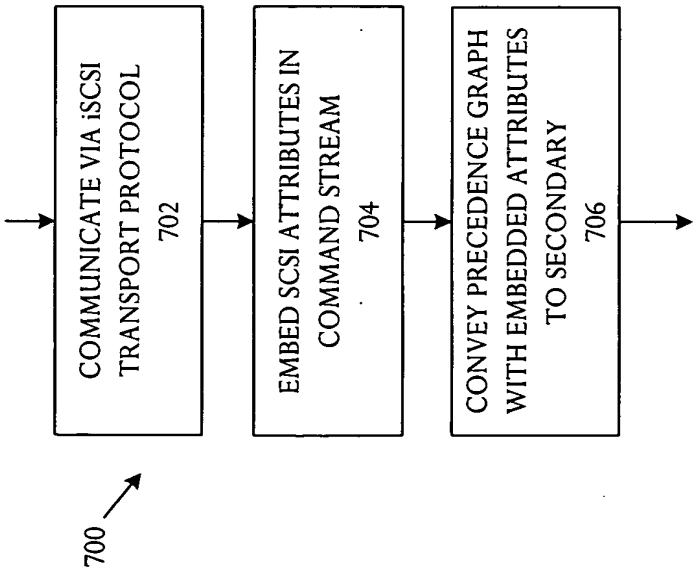
COMMUNICATE VIA iSCSI TRANSPORT PROTOCOL
702
EMBED SCSI ATTRIBUTES IN COMMAND STREAM
704
CONVEY PRECEDENCE GRAPH WITH EMBEDDED ATTRIBUTES TO SECONDARY
706
700

FIG. 7

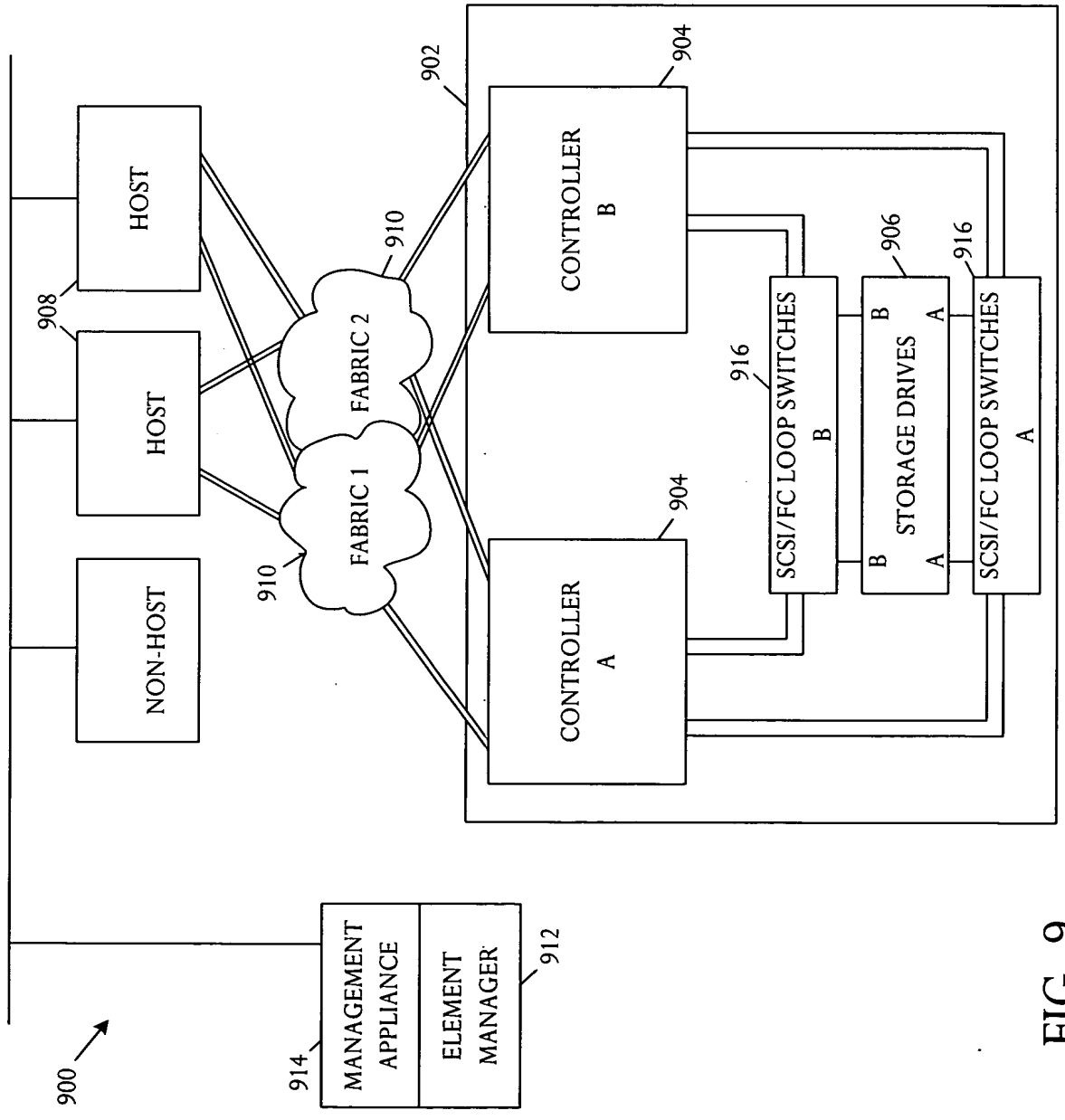
900
902
904
904
906
908
910
910
912
914
916
916
HOST
HOST
NON-HOST
FABRIC 1
FABRIC 2
CONTROLLER A
CONTROLLER B
SCSI/FC LOOP SWITCHES B
STORAGE DRIVES
SCSI/FC LOOP SWITCHES A
MANAGEMENT APPLIANCE
ELEMENT MANAGER

FIG. 9

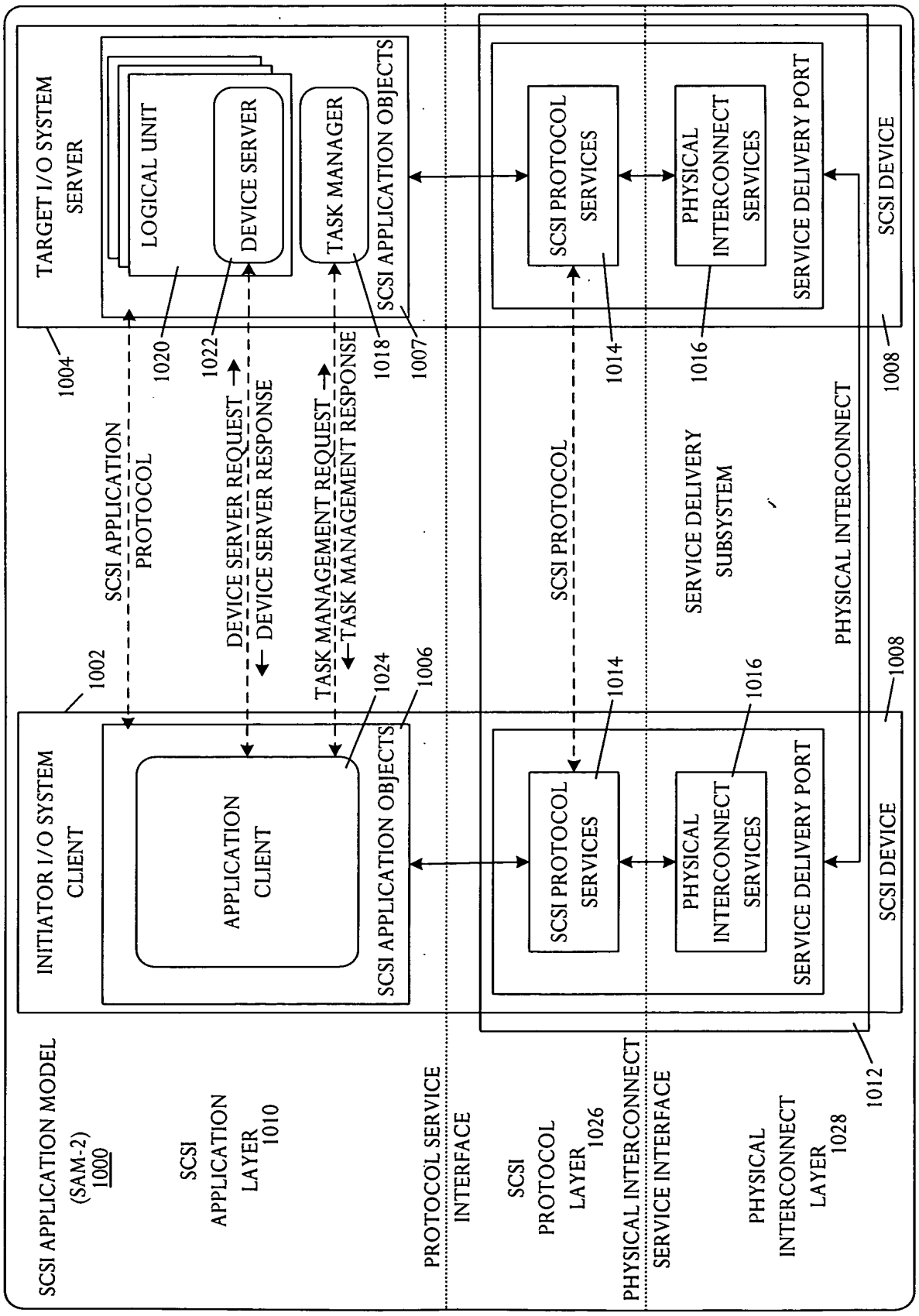
SCSI APPLICATION MODEL (SAM-2) 1000
SCSI APPLICATION LAYER 1010
PROTOCOL SERVICE INTERFACE
SCSI PROTOCOL LAYER 1026
PHYSICAL INTERCONNECT SERVICE INTERFACE
PHYSICAL INTERCONNECT LAYER 1028
INITIATOR I/O SYSTEM
CLIENT
APPLICATION CLIENT
SCSI APPLICATION OBJECTS
TARGET I/O SYSTEM
SERVER
LOGICAL UNIT
DEVICE SERVER
TASK MANAGER
SCSI APPLICATION OBJECTS
SCSI APPLICATION PROTOCOL
DEVICE SERVER REQUEST
DEVICE SERVER RESPONSE
TASK MANAGEMENT REQUEST
TASK MANAGEMENT RESPONSE
SCSI PROTOCOL SERVICES
PHYSICAL INTERCONNECT SERVICES
SERVICE DELIVERY PORT
SCSI DEVICE
SCSI PROTOCOL
SERVICE DELIVERY SUBSYSTEM
PHYSICAL INTERCONNECT
1002
1004
1006
1007
1008
1012
1014
1016
1018
1020
1022
1024

FIG. 10